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5 April 1963

MEMORANDUM FOR : The Record

SUBJECT : Status - GXCALT Engine Performance Improvement Program

1. Final engine performance data based upon high Mach and altitude calibration of development engine FX-116 is now available. This test data reflects the performance attainable with the next delivery engine no. 219 and up as provided by incorporation of the gas generator performance improvement package into the presently existing JOX afterburner configured engine. Estimates of this performance data forecast in November 1962 are identified as "Table III".

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2. This calibration was made at two flight conditions with each final test point representing approximately 4,000 calibration data points.

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3. Final test data shows that maximum available thrust meets the specification, that fuel consumption at maximum specified thrust is worse than specification, and that fuel consumption at thrust levels below 9% to 96% of maximum is better than specification.

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than the specification and is not comparable with Table III estimates which did not forecast this high a thrust. Specific fuel consumption at the same flight condition but at the maximum thrust level forecast in Table III is 12.7% better than Table III estimates and 8.5% better than the specification. Generally, specific fuel consumption

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is better than specification at thrust levels below 96% of the new maximum level available cited in paragraph 3.a; specific fuel consumption is worse than specification at thrust levels above this 96% point.

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worse than the specification and is not comparable with Table III estimates which did not forecast this high a thrust. Specific fuel consumption at the same flight condition but at the maximum thrust forecast in Table III is 2.3% worse than Table III estimates and 4.3% worse than the specification. Generally, specific fuel consumption meets the specification at thrust levels below 96% of the new maximum level available cited in paragraph 3.b; specific fuel consumption is worse than specification at thrust levels above this 96% point.

4. Development work at Pratt & Whitney is continuing in the area of further improvement in fuel consumption.

5. Estimated airplane performance resulting from the above change in engine performance is beyond the scope of this paper, however, a report 25X1A from based upon some comparative calculations using this same new engine data provides the best summary available at this time. This important report, attached herewith, indicates among other things that the net effect of this latest engine performance change is such that a comparison of A-12 climb and cruise performance using the original engine specification performance data with A-12 climb and cruise performance using this latest engine performance data reveals very little change in over-all airplane performance.

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Development Division
OSA-DD/R

Attachment:
As stated

25X1A DD/OSA rel
1-DD/R w/att
2-AD/OSA w/att
25X1A 3-D/T w/att
w/att
5-DD/OSA w/att
6-DD/OSA w/att
7-TAES/OSA w/att
8-SD/OSA w/att
9-C/PS/OSA w/att

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Attachment # 1

1. A brief check of the climb and cruise performance of the A-12 aircraft at the original full fuel weight of 117,000 pounds and with the original specification engines when compared with the latest P&W engine data revealed very little change in over-all performance.

2. The increased specific fuel consumption during 100% thrust during climb (normally 15-20 minutes) and during early cruise (50-60 minutes) at 95,000 feet offsets the improvement in SFC at lower power settings during the later stages of cruise flight and descent (70-80 minutes).

3. The above is predicated on the 117,000 pound gross weight and the necessity to maintain maximum altitude during penetration and cruise.

4. The program which was checked allows the aircraft to reach 85,000', 350 miles after leaving the tanker (an 18 minute climb from 25,000 feet to 85,000 feet). This provides a range of 4,160 miles and is predicated on a 15 minute reserve and a 15 minute refueling during which zero miles are covered.

5. During discussion with Kelly Johnson on this matter he flatly stated that we have learned so little about the installation losses, spillage drag, and inlet distortion up to now that any rework of the old performance figures based on the new P&W SFC's would be meaningless.

6. A 3 or 4 percent change in installation losses plus some added spillage drag would affect our performance spectrum.

7. A rework of the old weight versus altitude charts made up by Lockheed for Dr. Scoville in November 1962 shows that using the graph based on Table III, the new curve based on latest figures will be equal to or slightly above the curve titled "SF-237A Perf. Data".

8. In conclusion I would say that while it is too early to predict any improvement in range due to the new SFC's, we can definitely say that the new thrust figures have brought our operational altitudes back to where they were originally, provided the aircraft has not grown too much in weight. The actual weight of the aircraft is next to impossible to ferret out.